IC250: Lab assignment 3

1. **Frequency analysis of sparse spectrograms.**
   Note. This assignment is *not* to be done on HackerRank.

   A spectrogram is a plot that gives time-frequency representation of a signal (i. e. it tells what frequencies are present at what times.) Spectrograms are represented as matrices, with the columns representing time, and the rows representing frequencies. Spectrograms of birdcalls are typically sparse, hence giving rise to sparse matrices.

   By analysing spectrograms using a sparse matrix ADT, determine frequency histograms of three different bird species. The species under consideration are

   (a) Oriental cuckoo (has low-frequency calls)

   (b) Himalayan monal (has mid-frequency calls)

   (c) Rock bunting (has high-frequency calls)

   A sparse matrix ADT is provided, and histogram data corresponding to the three species are also provided. Plot the histograms using a plotting program like GNUPLOT. Each spectrogram must result in one histogram. For sample histogram plots, see the plots in the slides of lecture 3.

   Note 1. The spectrograms provided are in the form $T \times F$, where T represents time (this will depend on the duration of the signal) and F is the number of frequencies (in the data provided, F is fixed to 129, with 1 representing the lowest frequency, and 129 representing the highest frequency.)

   Note 2. A (partial) sparse-matrix ADT is provided. You can use that, or write your own ADT.